

# Analysis of China's energy storage industry under the dual carbon policy

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**Abstract.** With the increasingly serious global climate problem, green, low-carbon and sustainable development has become the main trend of global economic development. China has proposed a "dual carbon" target, and energy storage technology is one of the important supporting technologies to fulfill the "dual carbon" goal. As a key development area of the National "2025" plan and the "13th Five-Year plan" strategic plan, the energy storage industry has great potential for the future. As one of the leading enterprises in the energy storage sector, CATL has the advantages of advanced technology and large market share in the competitive environment. Therefore, this paper uses SWOT analysis and financial analysis to analyze CATL's internal and external environment and various financial indicators. PEST analysis is used to analyze elements both internal and external that affect the current energy storage industry market. It lays the theoretical groundwork for future development of CATL. It also provides experience for other Chinese energy storage enterprises to stabilize the domestic market and expand the international market.

**Keywords:** Dual carbon; CATL; SWOT analysis; financial analysis; PEST analysis.

## 1. Introduction

At present, energy shortage and climate change have become the hot issues of global concern. Carbon dioxide emissions from the global energy sector hit a record high of 36.3 billion tons in 2021, up 6% year on year, according to the Global Energy Review: CARBON Dioxide Emissions to 2021 released by the International Energy Agency (IEA). China, the world's largest emitter of carbon dioxide, has set a "dual carbon" target for 2020. "Dual carbon" is short for carbon peak and carbon neutral. China aims to peak its carbon dioxide emissions by 2030 and become carbon neutral by 2060 [1]. Abroad, new U.S. President Joe Biden has announced many details about the promotion of new energy, with an estimated \$174 billion spending on electric vehicles. Driven by relevant environmental protection policies, the competition in the new energy power battery industry is becoming increasingly fierce.

Energy storage is one of the important supporting technologies to fulfill the "dual carbon" goal. The development and maturity of the energy storage sector are key to accelerating the construction of new energy systems. In recent years, with the support of a series of national policies, China's energy storage industry (especially electrochemical energy storage) has grown rapidly, the cost has come down, the industrial chain layout has been constantly improved, and it has entered the initial stage of commercialization.

The energy storage industry has huge potential in the future. According to SNE Research, 20GWh of energy storage batteries will be shipped globally in 2020, up 82% from last year. In 2020, CATL ranked first with 34GWh, followed by LG Chem with 31GWh and Panasonic with 25GWh. As of 2020, CATL has been number one in the world for four consecutive years [2]. As a leading company in battery research and development and manufacturing, CATL has been following the national development policy, committed to the research of renewable energy power batteries, the development of new energy automotive industry. Therefore, in order to achieve the goal of "dual carbon",

enterprises and the country need to jointly introduce relevant policies and methods to solve the existing problems in technology, cost and other aspects.

With the decrease of energy storage cost and the continuous improvement of cycle life, the advantages of energy storage economy are gradually reflected. Relevant departments constantly introduce new laws and regulations, and users' economic consciousness promotes the upgrading and transformation of China's energy storage field, and the energy storage sector continues to develop vigorously. CATL has been in the energy storage industry for many years and has obvious advantages. It has established joint ventures with PSG supplier Costar and lithium equipment supplier Xinyun. In 2020, the turnover of CATL energy storage system reached 1.943 million yuan, and the annual growth rate was 218%. Lithium energy storage industry has huge development space, with the decline of battery prices, energy storage business is expected to grow more rapidly.

The research on energy storage system and the analysis of the development of energy storage industry can help China achieve the goal of "dual carbon" energy conservation and emission reduction as soon as possible. The "dual carbon" target brings a new profit model for enterprises - carbon trading. NIO reported a net loss in all its businesses in 2020, while the revenue from selling carbon emission credits was 100 million yuan. Tesla made \$1.4 billion from the sale of carbon credits in 2020, making it "the most profitable" for the company. Therefore, the future energy storage industry market will also usher in great changes, enterprises must improve their own economic benefits, in order to be in an advantageous position in the future market competition.

Contemporary Amperex Technology Co., LTD. (hereinafter referred to as "CATL") is used as the research lead to study the energy storage industry. PEST analysis is used in this paper to analyze the internal and external factors affecting the current energy storage industry market. Explore the development direction and prospect of energy storage industry.

This paper takes the CATL as an example and uses SWOT analysis to have a clear understanding of the internal and external environment of CATL, so as to better study some problems of the supply battery and the energy storage system and provide a theoretical basis for the sustainable development of CATL in the future. It also provides experience for other Chinese power battery enterprises to stabilize the domestic market and expand the international market. Financial analysis mainly has two emphases, revenue performance analysis and profitability analysis. Financial analysis method is used to analyze the business strategy and financial situation of CATL, reasonably predict the development trend of CATL, and further evaluate the future income level and risk degree of CATL, so as to determine the business strategy of the enterprise.

The rest of this paper is arranged as follows. Section 2 is a literature review. Section 3 is the research method. Section 4 is the results. And section 5 is the conclusion.

## 2. Literature Review

The proposal of the dual carbon target makes the energy storage industry attracted the attention of a wide range of scholars, and CATL, BYD and other enterprises also attracted attention. This paper reviews and collects the current literature and summarizes.

The global economy has been greatly impacted by COVID-19, but fortunately, the energy storage sector is still in the early stages of development and is expected to gradually recover its growth. This paper comprehensively analyzes future trends in the energy storage sector in foreign market and domestic market. Currently, the energy storage sector continues to grow and the energy storage sector continues to grow both domestically and abroad, with good prospects for the future. Zhang Sen analyzed the Current state of the energy storage sector from the export market share of lithium batteries in China [3]. Through the analysis of China's lithium battery export market, several countries with the largest market share are counted, the U.S., Germany and Japan. This shows that the future development potential of China's energy storage industry is huge, and the trade relationship with these three countries is inseparable. Under the control of COVID-19, the energy storage industry will flourish with the opportunity of energy transition in the future.

The proposal of dual carbon target makes carbon dioxide emission right as a special commodity carbon trading, which has an impact on the business strategy of enterprises. Companies with innovative technologies can earn higher revenues in the future because they can sell their carbon emissions to other companies. But there are problems with the deal. First, the initial allocation of carbon emission quotas is unfair. Second, government supervision and management are insufficient. Thirdly, enterprises have low enthusiasm to participate in carbon trading [4]. At present, the energy storage sector is developing rapidly and the market competition is becoming increasingly fierce. The government should improve relevant systems as soon as possible to promote the healthy development of the energy storage sector. For enterprises, it is crucial to improve their own innovation, with the most powerful technology, in order to remain invincible.

There are currently many references analyzing CATL. Most of them adopted financial analysis method to analyze various financial indicators in CATL. For example, Harvard analysis framework is used to analyze the financial situation of enterprises from the perspective of strategy, which is mainly divided into strategic analysis, financial analysis and prospect analysis. Through horizontal comparison of financial indicators and comparative analysis with GuoXuan High-tech, a conclusion was drawn [5]. Energy storage industry competition is increasingly fierce, CATL will also accept the challenge. In the case of mass production, some enterprises reduce production costs by producing and selling their own power battery systems. The other part of enterprises comply with the market's demand for diversified production across fields and obtain support and subsidies from government actions to increase the intensity of competition and disperse the company's operating risks [6]. Based on the past financial statement analysis and research, this paper links the financial analysis of CATL with the development of the energy storage sector, which not only provides help for the managers of CATL to make accurate decisions, but also provides reference for other Chinese energy storage enterprises to establish themselves in the market and improve their competitiveness.

According to the existing literature, the current situation of China's energy storage sector and typical enterprises in the energy storage industry has been relatively mature. Through many methods of analysis, such as financial analysis. However, there are not many references that combine these two aspects. This paper takes CATL as the research object to analyze the current development and prospects of energy storage industry.

### 3. Method

In this study, the research method for the energy storage industry is PEST Analysis. One of the leading companies in the energy storage industry -- Contemporary Amperex Technology is the target company in this study, the research method is SWOT Analysis and financial analysis. PEST analysis analyzes the macro external factors of the industry with respect to its political (P), economic (E), social (S), and technological (T) aspects. SWOT analysis is a comprehensive evaluation of the company's internal and external environment in terms of its internal strengths (S), internal weaknesses (W), external opportunities (O), and external threats (T). The SWOT analysis is a comprehensive evaluation of the internal and external environment of the company, to integrate the internal and external strategic resources of the company. There are two main focuses under the financial analysis section, revenue performance analysis and profitability analysis. For this study, the industry information was collected from CNESA (China Energy Storage Alliance), the company information was collected from the 2021 annual report of Contemporary Amperex Technology and Energy Storage System Solutions and Product Brochure from Contemporary Amperex Technology.

### 4. Results

#### 4.1 Industry Analysis

According to CNESA data, by the end of 2021, China has commissioned energy storage projects with a cumulative installed capacity of 46.1GW, accounting for 22% of the total global market size.

The upstream of the industry chain of the energy storage industry is the equipment supplier, primarily supplying battery pack, battery management system, energy management system, power conversion system. The supply and installation of energy storage systems constitute the midstream of the industrial chain of the energy storage industry. The downstream of the industry chain of the energy storage industry includes power plants, grid companies, businesses and residential users, etc.

#### 4.1.1 Energy Storage Industry PEST Analysis

For the political factors analysis, China's national policy provides strong support for the growth of the energy storage industry. China has introduced several supportive policies to promote the industry's development, including 'The New Energy Storage Development Plan During China's "14th Five-Year Plan" Period' which was issued in 2022, specified China's national energy storage plans for the future [7]. 'Guidance on Accelerating the Development of New Energy Storage' was issued in 2021 to define the future application fields for energy storage and aim to foster the development of business models for energy storage [8].

For the economic factors analysis, in 2021, China's GDP grew 8.1% from 2020, posting the strongest economic growth rate among the world's major economies. China's total economic aggregate reaches RMB 114.4 trillion, accounting for an estimated share of the global economy of more than 18%. Even with the impact of COVID-19, China's overall macroeconomic environment is stable and improving. The current state of commercialization of the energy storage industry is not adequate in China, for the corresponding price mechanism and market mechanism still need to be improved [9].

For the social factors analysis, in recent years, China has increased its efforts to promote environmental protection and public awareness of environmental protection has increased. More and more companies are paying attention to ESG development and fulfillment of social responsibility, and people choose a more environmentally friendly lifestyle. While energy storage application safety requires special standards, the energy storage industry has not yet been able to create a single safety standard and a recognized solution for the commercialization of energy storage systems [10].

For the technological factors analysis, a variety of energy storage technologies have been further developed in recent years. Technology advancements have enhanced lithium-ion battery capacity and lengthened their useful lives. The cost of lithium-ion battery energy storage systems is also decreasing, and by 2020, it was as low as 1500 RMB/kW [11]. Technological improvements have lowered costs and broadened potential opportunities for promoting energy storage systems.

#### 4.2 Company Analysis of Contemporary Amperex Technology Co., Ltd. (CATL)

Founded in 2011 and headquartered in Ningde, China, Contemporary Amperex Technology Co., Ltd. (CATL) is dedicated to offering top-notch solutions for worldwide new energy applications and concentrates on the research, development, manufacturing, and sales of new energy vehicle power battery systems and energy storage systems. Battery management systems, energy storage systems, and lithium-ion battery components are among CATL's core offerings.

According to the 'Energy Storage System Solutions and Product Brochure' of CATL, to optimize the energy structure, improve the safety of the power system, and reduce the cost of energy use, CATL provides four energy storage solutions, including Liquid Cooling Solution, UPS Solution, Base Station Solution, and Household Energy Storage Solution.

##### 4.2.1 SWOT Analysis of CATL

For the strengths of CATL, the company puts much emphasis on technology development, in 2021, R&D investment take up to 5.9% of the company's revenue. CATL led and CATL led and participated in the formulation or revision of more than 70 national and international standards. In 2021, CATL has in total of 10222 issued patents. The emphasis on research and development and investment in technology and innovation is conducive to CATL's ability to improve its product competitiveness.

With regard to energy storage batteries, the company had established and strengthened strategic alliances with power generation companies including STATE GRID Corporation of China and

CHINA HUANENG GROUP, new energy companies like Risen Energy, and well-known clients like Fluence.

The company actively raised the share of renewable energy usage in 2021, continued to construct more photovoltaic energy, and reach a share of green power use of 22%. The company promoted several energy-saving and carbon-reduction strategies in 2021, employed equipment transformation and refinement as well as other approaches to cut greenhouse gas emissions.

CATL was No.1 in the global market share of BESS battery production in 2021. CATL has delivered more than 100 large-scale energy storage projects worldwide. Covering major energy storage markets including the United States, China, Germany, the United Kingdom, and Australia, rendering local energy storage services such as clean energy utilization, auxiliary services for grids, peak-load shifting and valley filling.

For the weaknesses of CATL, the company is facing challenges from domestic and international competing companies in the energy storage industry. CATL needs to continuously adjust its production capacity and reduce costs and prices to a certain level in order to maintain its competitive advantage.

For the opportunity of CATL, electrochemical energy storage products have higher reliability and stability than wind power, photovoltaic and other clean energy generations. The prospects of electrochemical energy storage goods are positive owing to the implementation of several pertinent support policies in China, the improvement of product safety, and the growth in market demand.

For the threats of CATL, the impact of the COVID-19 pandemic on the production and operation of the energy storage industry chain, along with the risk of inflation and a potential decline in market demand, will adversely affect the renewable energy industry, which in turn will have a negative influence on the CATL's operating performance and financial position, such as the rising prices for raw materials required.

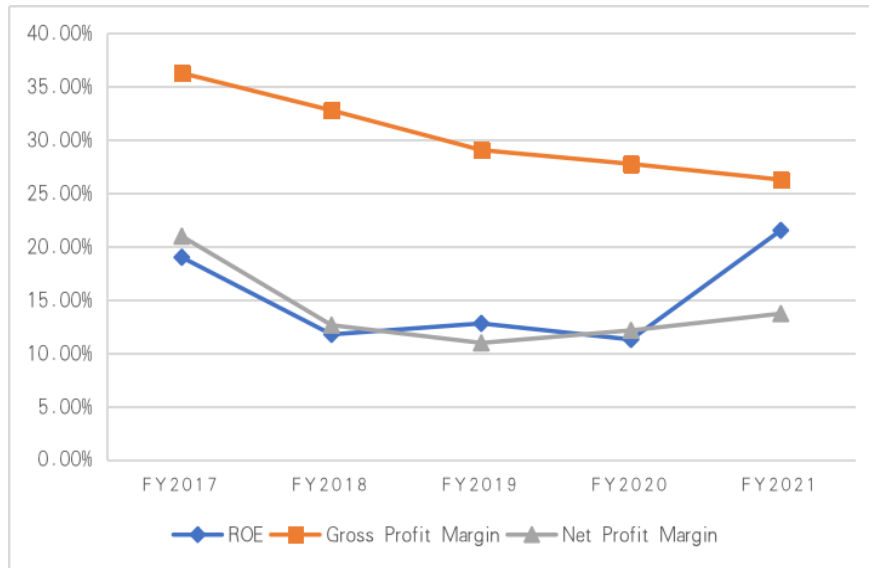
While the lithium-ion battery market is developing rapidly, it is also attracting new entrants to join the competition in various ways, while the existing power battery companies are also expanding their production capacity, and the market competition is becoming increasingly intense.

#### 4.2.2 Financial Analysis of CATL

**Table 1.** CATL Revenue per Business

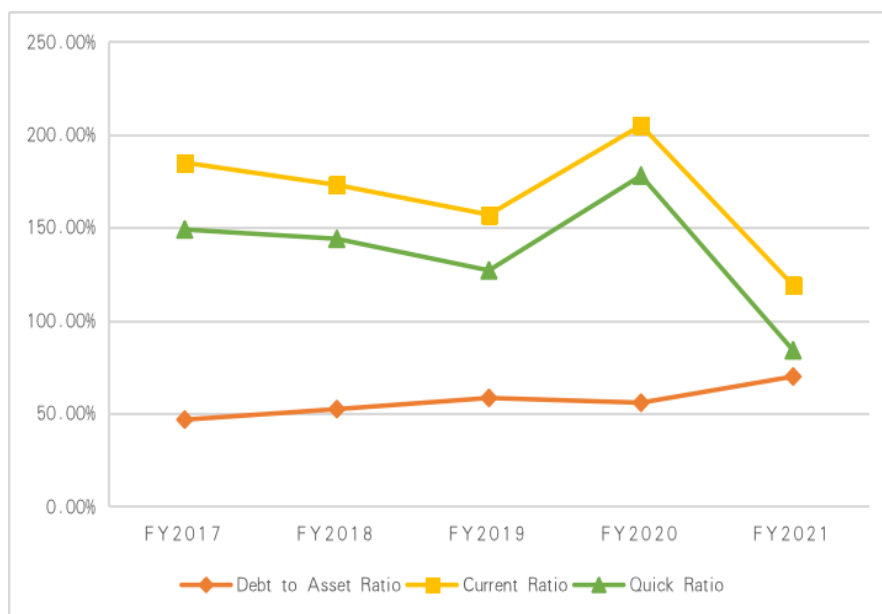
(CNY in Billion)	FY2020	FY2021
Power Battery Systems	39.43	91.49
Lithium Battery Material	3.43	15.46
Energy Storage Systems	1.94	13.62
Others	5.52	9.78
Total	50.32	130.35

CATL's energy storage revenue was 13.62 billion RMB in 2021, accounting for 10.45% of total revenue. There is a significant increase of 602.06% in revenue of energy storage systems from 2020 to 2021. Energy Storage Systems could generate more revenue for the company in the future.



**Figure 1. Profitability Ratios**

In terms of profitability, CATL's gross profit margin has been declining moderately in recent years, but the net profit margin has been increasing in the past three years, which can be explained by growth in sales and a decrease in period expenses. CATL's ROE shows more growth from 2020 to 2021 compared to the previous years, from 11.27% to 21.52%, with promising earnings prospects in the future.



**Figure 2. Solvency Ratios**

For the solvency ratios analysis, the debt to asset ratio of CATL shows an upward trend in recent years, with 69.90% in 2021. CATL not only expands the scale of production and operation but also can use financial leverage to get more investment profit when the operation is in good condition. CATL's Current Ratio and Quick Ratio increased from 2019 to 2020 but decreased from 2020 to 2021, and the company's short-term solvency decreased in the context of the company's expansion.

## 5. Conclusion

The purpose of this study is to provide an inductive summary and analysis of the Chinese energy storage industry and the company of Contemporary Amperex Technology. The outlook for the development of China's energy storage industry is generally positive, even though there is nevertheless scope for further improvement in terms of safety issues and the commercialization of energy storage. One of the leading companies in the energy storage sector, CATL, benefits from cutting-edge technology and a large market share in the competitive environment, with good performance in various financial indicators, but still needs to focus on aspects such as cost reduction in the highly competitive environment. This study does not cover comparisons with other similar companies in the company research section. The findings of this study can be somewhat helpful in analysing how China's energy storage business will evolve in the future.

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